REMARKS

This application has been reviewed in light of the Final Office Action dated February 13, 2008 and the Advisory Action of May 8, 2008. Claims 1-4, 8-12, 17, 32-33, 35, 39, and 40-44 are pending in the application. By the present amendment, claims 1, 17, 32-33, 35, 37, 39 and 41-43 have been amended. No new matter has been added. Claims 5-7, 13-16, 18-31, 34, 36 and 38 have been cancelled without prejudice. The Examiner's reconsideration of the rejection in view of the amendment and the following remarks is respectfully requested.

The Applicant notes with appreciation the telephone conversation with Examiner Lennox on June 10.

By the Office Action, claims 31-33, 35, 38 and 41-43 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Publication No. 2003/0216905 to Chelba et al. (hereinafter Chelba). Claims 31 and 38 have been cancelled without prejudice. Claims 32-33, 35 and 41-43 have been amended to be dependent from new claim 44.

Claim 44 recites, *inter alia*, a speech recognition engine configured to generate a set of likely hypotheses using a speech recognition method for recognizing speech; a unified language model including a semantic language model and a lexical language model configured for rescoring the likely hypotheses to improve recognition results by using sentence-based semantic content and lexical content wherein the unified language model is trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent

label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position to compute word probabilities; and the speech recognition engine configured to score parse trees to identify a best sentence according to the sentences' parse tree by employing semantic information and lexical information in the parse tree to clarify the recognized speech.

As set forth, Chelba is directed to an information extraction system that employs a conventional syntactic parse tree structure and semantic information to extract a context for written TEXT. The parse tree is employed to provide a two-level approach in training the system. The two level approach provides semantic information for training models to collect additional information not provided in the text (to fill in slots in a template). See paragraphs [0006] and [0007]. While Chelba discloses the use of the structured model in speech recognition, there is no disclosure or suggestion of a unified model used in rescoring hypotheses already provided by a speech recognition system. Further, the training of the model in Chelba is completely different from the present claims.

Chelba does not disclose or suggest a unified model that is trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position to compute word probabilities.

Further, Chelba does not disclose or suggest that the unified language model is configured to **rescore** a set of likely hypotheses generated by using a speech recognition method for recognizing speech. The present invention is directed to providing a separate unified model that **rescores** that conventional speech recognition results. (See page 21, lines 1-13, FIG. 4 and the examples on pages 18-20).

Chelba uses semantic parsing as a way of training a model. The model is trained using a two-level root/leaf method (see paragraphs [0080]-[0081]). This parsing looks for hypotheses that fit the structure (a template to be filled in) and eliminates all others. Chelba does not employ a unified model having semantic model trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position to compute word probabilities. Further, Chelba does not rescore an output of a speech recognition engine to improve the recognition results. Instead, Chelba teaches that the semantic model 420 may be used directly for speech recognition and for information extraction. Chelba is not concerned with providing a additional rescoring step as set forth in the present claims.

Since Chelba fails to teach all of the claimed elements of claim 44, claim 44 is believed to be in condition for allowance for at least the stated reasons. Claims 32-33, 35, 37, 39 and 41-43 are also believed to be in condition for allowance due at least to there dependency

from claim 44. Reconsideration of the rejection is earnestly solicited.

By the Office Action, claims 1, 3, 5, 8-11, 14, 17-19, 21, 24, 27 and 30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chelba in view of U.S. Patent Publication No. 2002/0087316 to Lee et al. (hereinafter Lee). Claims 5-7, 13-16, 18-30 have been cancelled without prejudice.

Claim 1 has been amended to further prosecution of the case.

Claim 1 now includes, *inter alia,* a method for speech recognition, comprising the steps of: generating a set of likely hypotheses using a speech recognition method for ~~in~~ recognizing speech; rescoring the likely hypotheses by using sentence based semantic content and lexical content by employing a semantic structured language model which combines a semantic language model and a lexical language model wherein the semantic structured language model is trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position; and scoring parse trees to identify a best sentence according to the sentences' parse tree by employing semantic information and lexical information in the parse tree to clarify the recognized speech.

Note the steps of generating and rescoring are separate. This is consistent with the arguments set forth above with respect to claim 44. The information extraction of Chelba fails to disclose or suggest the rescoring step as set forth in claim 1.

Lee is directed to syntactic system where grammars, semantic, and parts of speech are used to recognize speech. Lee does not provide a unified model (lexical and semantic), or a parse tree/parse tree selection based upon lexical and semantic information, as described above. The speech is recognized and the results are provided to an understanding module 38. The understanding module uses the recognized speech to associate with a "goal" with expected syntactic or semantic structures. The structures are provided since the context of the speech is known and a grammar is employed (a grammar for appropriate responses in a telephone call in used as an example in Lee). The better the fit to the grammar structure the higher the confidence in the speech hypothesis.

However, Lee does not rescore the hypothesis as set forth in the present claims. Further, nowhere in the cited combination of Chelba and Lee is rescoring the likely hypotheses by using sentence based semantic content and lexical content by employing a semantic structured language model which combines a semantic language model and a lexical language model wherein the semantic structured language model is trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position disclosed or suggested.

As such, claim 1 is believed to be in condition for allowance for at least the stated reasons. The dependent claims 2-4, 8-12, and 17 are also believed to be in condition for

allowance due at least to their dependencies from claim 1. Reconsideration of the rejection is earnestly solicited.

Claims 15 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chelba in view of Lee and further in view of Ratnaparkhi ("Learning to Parse Natural Language with Maximum Entropy Models", 1999 (hereinafter Ratnaparkhi).

The Examiner stated that Chelba and Lee fail to disclose wherein the semantic structured language model is trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position but that Ratnaparkhi teaches these limitations.

While Ratnaparkhi teaches providing a "limited look ahead" intuition for parsing, the features and questions taught by claims 15 and 28, which have been incorporated into claim 1 and 44 are not disclosed or suggested. Ratnaparkhi does not disclose or suggest a model trained by including a unigram feature, a bigram feature, a trigram feature, a current active parent label (Li), a number of tokens (Ni) to the left since current parent label (Li) starts, a previous closed constituent label (Oi), a number of tokens (Mi) to the left after the previous closed constituent label finishes, and a number of questions to classify parser tree entries, wherein the questions include a default, (wj-1), (wj-1, wj-2), (Li), (Li, Ni), (Li, Ni, wj-1), and (Oi, Mi), where w represents a word and j is and index representing word position. There is

nothing in Ratnaparkhi that would lead one skilled in the art to arrive at the present claims 1 and 44. Therefore, the combination of Chelba, Lee and/or Ratnaparkhi fails to disclose or suggest the subject matter of claim 1 and 44.

The Examiner stated in the advisory action that there was no explanation by the Applicant as to why applicant state that Ratnaparkhi does not teach or suggest claims 15 and 28. The reason is that the features set forth in the present claims are not provided in Ratnaparkhi. Section 3.2 and 3.2.1 and FIG. 9 as cited by the Examiner do not teach or suggest the elements as set forth in the present claims 1 and 44 as suggested by the Examiner. It is noted that it is the Examiner's burden to establish a prima facie case of obviousness. If all of the elements of the claim are not shown or suggested than such a case is not made. While Ratnaparkhi discloses employing history parameters to find context in the prediction of parsing actions, there is no disclosure or suggestion of the advantageous set of questions/parameters as set forth in the present claims. Further, the present inventors have discovered that this collection of information is particularly useful. (See e.g., the present specification at page 14, lines 12-16).

Claims 1 and 44 are therefore believed to be in condition over the cited combination for allowance for at least the stated reasons. Reconsideration of the rejection is earnestly solicited.

By the Office Action, claim 2 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Chelba in view of Lee and further in view of U.S. Patent Publication No. 2005/0055199 to Ryzchachkin et al. (hereinafter Ryzchachkin); claims 4, 6-7, 13, 15-16, 20, 22-23, 26 and 28-29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chelba

in view of Lee and further in view of Ratnaparkhi in "Learning to Parse Natural Language with Maximum Entropy Models", 1999 (hereinafter Ratnaparkhi); claims 34, 36-37 and 39-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chelba in view of Ratnaparkhi; and claims 12 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chelba in view of Lee and further in view of San Segundo et al., "Confidence Measures for Spoken Language Dialogue Systems", 2001 (hereinafter San Segundo).

Claims that depend from claims 1 and 44 respectively are also believed to be in condition for allowance for at least the stated reasons.

In view of the foregoing amendments and remarks, it is respectfully submitted that all the claims now pending in the application are in condition for allowance. Early and favorable reconsideration of the case is respectfully requested.

It is believed that no additional fees or charges are currently due. However, in the event that any additional fees or charges are required at this time in connection with the application, they may be charged to applicant's IBM Deposit Account No. 50-0510.

Respectfully submitted,

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